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Student: Maria Georgakopoulou

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Instructor: Prof. John Chalikias

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Feasibility Analysis

Regarding the establishment of the aquaculture unit FISHGEN S.A.

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1. Introduction

1.1 Description of the investment plan

The present feasibility study concerns the establishment of the aquaculture unit FISHGEN S.A.

Consumption of fish is gradually increasing. The main reasons are the change in consumption patterns, the raising of living standards and population growth, while supply from traditional fishing is either stagnant or declining (for some species), due to overfishing and also specific regulations and prohibitions imposed by the European Union and other international organizations. The reduction of fish supply from traditional fishing revealed that the only way to meet the ever-increasing demand was to strengthen this sector, reporting a very high growth of the industry in recent years in Greece and worldwide.

This new aquaculture unit will produce and market 450 tons of sea bass (*Dicentrarchus labrax*) and 650 tons of sea bream (*Sparus auratus*). The two species have been selected due to their very good cost-effectiveness ratio. The process of production is relatively simple, while the technology and know-how at all levels is developed in a satisfactory level.

The target market for the newly established unit will be end-consumers as well as wholesalers and other companies in the industry that have developed distribution networks, not only in the domestic but also in foreign markets.

The goal of the unit is to be able to establish itself in the industry, ensuring stable annual sales, increasing production volumes, developing strategic alliances with the largest companies in the industry and developing its own distribution network. A long-term goal is considered the full vertical integration of the unit as well as the processing of the final product, in order to be able to address to a different part of consumers.

The aim of the company is to produce and distribute sea bream and sea bass in the Greek market as well as to create the appropriate conditions, in order to expand its activities in a direct way also to foreign markets. Furthermore, the purpose of the company is to plan its long-term perspective, establishing stable relationships with suppliers, dealers and other companies in the industry. Such relationships will allow it to perform sales in such volumes that will provide profits, so that it can expand its activities, in the future, in other directions, as the cultivation of other species, trading and processing. The short-term goal is to achieve a market share of a total 1.5% of the production of sea bass and sea bream in the first five years of operation. This percentage represents the annual production of 1100 tons of fish.

1.2 Productivity capacity and cost

After careful evaluation of multiple sites, the unit is proposed to settle in the prefecture of Fokida, on a land plot of 8 acres. This area fully covers the needs of production and allows for future extensions. The prefecture of Fokida, in addition, has adequate workforce with the relative experience required for the positions, due to the function of other aquaculture units that have been operating in the area for years. Also the temperature of the water and its salinity in this area, are the two most important physical factors that affect the rate of weight increase in juveniles, and their survival rates.

The selling price of the final product is determined by the seasonality of demand and supply, the prices of competitors and the net weight of the final product. The demand for fish is increased in the summer, mainly due to the increase in tourist traffic while it decreases in the winter. Production costs do not play an important role in price formation. Businesses in the sector that do not manage to limit production costs below the formed selling prices, are forced to sell their product at the market prices, otherwise they cannot allocate production. The price is set at 8.000€/ ton.

Table 1 below, shows the productivity of the unit, in a 5-year projection. The percentage of utilisation is estimated to start from 70% in Year 1 to reach 95% in Year 5, at full capacity of production of 1.100 tons of fish. Therefore, we can observe a steady increase in the operations turnover, starting from 6.160.000€ in Year 1, to an estimated amount of 8.380.612 € in Year 5, at a growth rate of 8%. And considering a gross profit rate of 32%, we have a total production cost at the amounts of 4.188.800€ in the first year, to 4.523.904€ in Year 2 and then 5.698.816€ as the unit will begin to reach full capacity at maximum productivity.

Table 1. Productivity Capacity

PRODUCTIVITY CAPACITY					
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Capacity (ton)	1,100	1,100	1,100	1,100	1,100
Percentage of utilisation	**70%**	**76%**	**82%**	**88%**	**95%**
Production (ton)	770	832	898	970	1,048
Average Selling Price / ton	8,000 €	8,000 €	8,000 €	8,000 €	8,000 €
Operations turnover	**6,160,000 €**	**6,652,800 €**	**7,185,024 €**	**7,759,826 €**	**8,380,612 €**
Gross Profit Rate	32%	32%	32%	32%	32%
Production cost	**4,188,800 €**	**4,523,904 €**	**4,885,816 €**	**5,276,682 €**	**5,698,816 €**

2. Analysis of investment cost

2.1 Fixed costs

The initial fixed costs of the investment amount to 4,641,930 € which analytically include, 50,000 € for land expenditures, 200,000€ for building facilities, 30,000€ for electrical installations, 3,521,930 € for the acquisition of mechanical equipment, 50,000€ for transportation costs. Furthermore, the amount of 760,000€ is related to pre-operational costs and the amount of 30,000 € to unpredictable costs.

Table 2. Investment Cost

INVESTMENT COST	
ELEMENT OF INVESTMENT	**VALUE**
Land	50,000 €
Building Facilities	200,000 €
Electrical Installations	30,000 €
Mechanical Equipment	3,521,930 €
Know - How	0 €
Transportation	50,000 €
Pre-operational Costs	760,000 €
Unpredictable costs	30,000 €
TOTAL	**4,641,930 €**

The place where the aquaculture unit will be located will contribute decisively to the success of this investment project. The peculiarity of the specific project is about the need for both terrestrial land and marine. The estimation of needs in building facilities, is an area of 550 m² for the packing station, office departments and storage of stocks. In particular, an area of 350 m² is required for packing, 50 square meters for the housing of the stocks (by-products, food and other supplies) and an area of 150 square meters for the accommodation of administrative facilities. Taking into account the parking areas as well as loading and unloading areas and premises necessary for future extensions, it is estimated that total land needs are 2 acres.

Electrical installations of the building, and transportation costs, are also among the initial cost of investment, as observed and at the amounts specified at the Table above.

The installation of mechanical equipment and the final configuration of space is a process that will take place both before and after the start of the production process. Marketing will begin 2 months before the commencement of the production process. Due to the nature of the production (14-18 months for the completion of a production cycle), the basic marketing actions will take place after the process, but a first market investigation is required.

The legal establishment of the new company, legal expenses, civil engineering projects, the cost of managing and execution of the project, official license and official registration of the new company, are among the pre-operational costs.

In order for the unit to be able to cope with any unforeseen situations, an estimation of the possible risks may have to be made. The most important risks that are most likely to arise in relation to supplies are the occurrence of defective or inappropriate products, supplier failure to meet their obligations, inability to store supplies. The unpredictable costs could also cover any other need that is created during the set-up of the unit.

2.2 Financing of the investment

As for the financing of the investment, the aquaculture unit will cover its capital needs from equity contribution of the company, as well as bank loan, and the provisions of program subsidies of the Greek development law 3299/2004.

The cost will be covered by 32% (1,485,418 €) from own funds, by 38% (€ 1,763,933) from state subsidy and 30% (€ 1,392,579) from a bank loan.Working capital will be financed by 50% from equity contribution at the amount of 742,709 € and 50% from a bank loan, at the total amount of 1,485,418 €.

Table 3 Financing of investment and working capital

FINANCING OF INVESTMENT		
SOURCE	**PERCENTAGE (%)**	**VALUE**
Equity contribution	32%	€1,485,418
Subsidy Law 128/82	38%	€1,763,933
Long-term debt	30%	1,392,579 €
TOTAL	**100%**	**4,641,930 €**

FINANCING OF WORKING CAPITAL		
Equity contribution	*50%*	742,709 €
Long-term debt	50%	742,709 €
TOTAL	**100%**	***1,485,418 €***

2.3 Cost analysis

Proper site selection is one of the most critical points in the current investment plan. Due to the fact that the production process takes place in the natural environment, the choice should be made with such criteria as to ensure not only the stability of the unit but also the protection of the environment, and secondly to meet the requirements of marketing and production. A marine area of 20 acres needs also to be leased. The total rental cost of the marine area which will be allocated to the unit for the first year amounts to 167,552 €.

As raw material, it is considered not only the spawn of the sea bream and sea bass, but also the fish feed. Domestic production of spawn is covered mainly by domestic demand (with the trend of further growth), while a small part of domestic demand is covered by imports, which however may increase, if necessary (e.g. due to the inability of Greek firms to meet the demand). This, combined with an increase in future domestic spawn production, ensures the uninterrupted market supply of sea bream and sea bass spawn. For the first year of operation the amount of its cost is 1,466,080 €.

In addition to the raw materials, it is necessary to record in detail subsidiary materials and supplies necessary for the plant to work seamlessly and without any interruptions. The unit's electricity needs are defined as the needs of the land-based facilities in the area and the place of installation. For security reasons, the unit will be equipped with an electric generator, which will allow it to deal with any extraordinary events. Furthermore, the unit will possess three vehicles (a refrigerator truck, a passenger transport vehicle and a general purpose vehicle). The fuel that will be required during the year should cover the needs of the vehicles and facility's engines. A small amount of fuel will also need to be stored for the aforementioned purposes.

The packaging materials required for the operation of the unit are specific polystyrene containers, suitable for foodstuffs (at various capacities), into which the final product will be placed. These containers will be of capacity at a net product weight of 3, 5 and 10 kilos and the unit will have a special storage space for these materials (as is also provisioned by Greek law).

The needs of the newly established unit in metal parts are estimated as in the table below. The needs are expected to cover issues of maintenance of the fish cages, automatic feeding mechanism as well as the packaging department. The machine maintenance will also be performed by the supplier companies.

The unit will employ a total of 69 people, 47 of which will be labor force and 22 people as administrative and technical staff. The specialties which are necessary are neither rare nor specialized in the labor market. As a result, no problems are expected during the staffing process of the unit. Labor costs in the first year of operation are 1.340,416 €.

At "other expenses" are included sufficient amounts of "antifouling" liquid by which the fish nets are washed by the dipping method. Also adequate quantities of vaccines are needed for the vaccination of juveniles (either by immersion or by injection) during the first months of the production process. Finally quantities of disinfectant and cleaning liquids for the machines and the workbenches are included. The company will provide its employees with the necessary uniforms and equipment, which are necessary not only for personal safety but also for the quality and protection of the final product.

Table 4 Cost Analysis

COST ANALYSIS	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Raw Materials and Subsidiary Materials	1,466,080 €	1,780,240 €	2,094,400 €	2,094,400 €	2,094,400 €
Metal Parts	670,208 €	813,824 €	957,440 €	957,440 €	957,440 €
Personnel costs	1,340,416 €	1,627,648 €	1,914,880 €	1,914,880 €	1,914,880 €
Power	209,440 €	254,320 €	299,200 €	299,200 €	299,200 €
Rental of sea area	167,552 €	203,456 €	239,360 €	239,360 €	239,360 €
Packaging - Transport	104,720 €	127,160 €	149,600 €	149,600 €	149,600 €
Maintenance	146,608 €	178,024 €	209,440 €	209,440 €	209,440 €
Other Expenses	*83,776 €*	*101,728 €*	*119,680 €*	*119,680 €*	*119,680 €*
TOTAL	**4,188,800 €**	**5,086,400 €**	**5,984,000 €**	**5,984,000 €**	**5,984,000 €**

3. Projections of economic results

3.1 Sensitivity analysis

The sensitivity analysis assesses the effects of possible changes in the project variables on the project's financial and economic performance indicators.

In order to evaluate the investment, a main project performance indicator is the Net Present Value. The net present value of a project is the sum of the discounted net flows of a project. The net present value is a very concise performance indicator of an investment project as it represents the present amount of the net benefits flow (i.e. benefits less costs) generated by the investment, expressed in one single value with the same unit of measurement used in the accounting tables. Net present value is a very simple and precise performance indicator. A positive net present value, means that the project generates a net benefit (because the sum of the weighted flows of costs and benefits is positive) and it is generally desirable either in financial or in economic terms.

Moving further, the internal rate of return (IRR) is defined as the discount rate that zeroes out the net present value of flows of costs and benefits of an investment. The IRR is an indicator of the relative efficiency of an investment, and should be used with caution. When the IRR is greater than the cost of financing the project, we should accept the investment.

Whether to accept or reject the proposed project depends on its net present value (NPV). Hence, sensitivity analysis is calculated in terms of NPV. Firstly, the base-case scenario is developed and the NPV is calculated for the project based on the assumptions which are believed to be the most accurate. Then, changes in the initial assumptions based on other potential assumptions, lead to the NPV recalculation. Once the new NPV is calculated, we analyze its sensitivity in terms of the changes made in the initial assumptions.

Sensitivity analysis is very useful tool that shows the robustness and the vulnerability of the project, due to the change in the values of variables. It indicates whether the project is worth to be conducted with the help of the NPV value estimation.

At the graph below, we have constructed a scatter plot which shows the project's NPV profile at different discount rates, varying from 1% - 25%. What we observe is that regardless of the change in the discount rates, the NPV is positive, which is an indicator of the investment's viability and high chances of success.

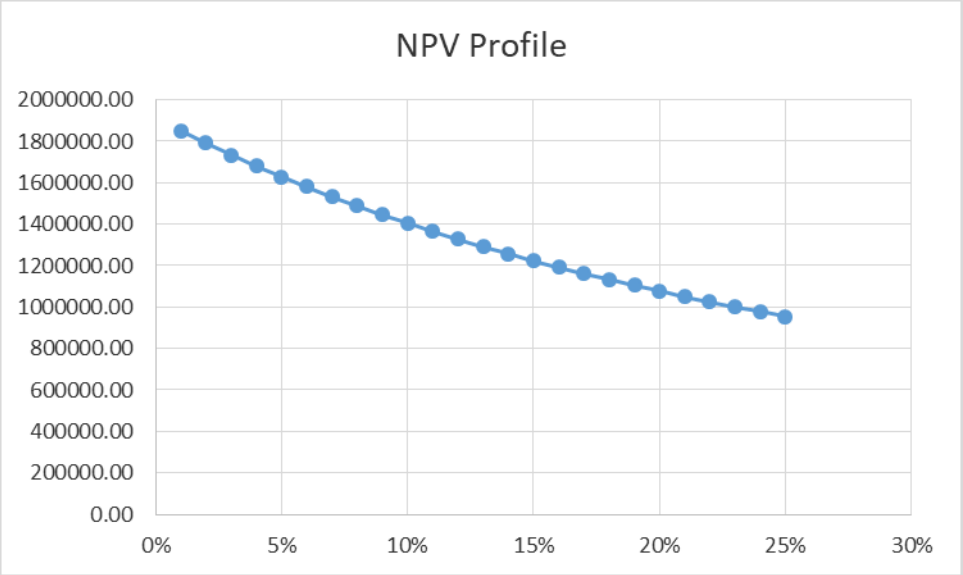

Figure 1. NPV Profile

The five-year projections[1] at Table 5 below, show the results of the unit's operational activity, the allocation of the profits and the net amount of revenues for each operational production cycle.

Table 5 Operational results

OPERATIONAL RESULTS	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
(loan repayment period)	1	2	3	4	5
Operations turnover	**6,160,000 €**	**6,652,800 €**	**7,185,024 €**	**7,759,826 €**	**8,380,612 €**
Cost of Production (excl. Depreciation)	4,188,800 €	4,523,904 €	4,885,816 €	5,276,682 €	5,698,816 €
Gross profit	**1,971,200 €**	**2,128,896 €**	**2,299,208 €**	**2,483,144 €**	**2,681,796 €**
Minus:					
Administrative expenses	308,000 €	332,640 €	359,251 €	387,991 €	419,031 €
Selling expenses	492,800 €	532,224 €	574,802 €	620,786 €	670,449 €
Interest	149,470 €	132,519 €	114,382 €	94,975 €	74,209 €
Earnings before Depreciation	**1,020,930 €**	**1,131,513 €**	**1,250,773 €**	**1,379,392 €**	**1,518,107 €**
Depreciation					
Land	200,000 €	190,000 €	180,500 €	171,475 €	162,901 €
Fixed assets	3,601,930 €	3,241,737 €	2,917,563 €	2,625,807 €	2,363,226 €
Total Depreciation	**370,193 €**	**333,674 €**	**300,781 €**	**271,154 €**	**244,468 €**
Net Profit / Loss	**650,737 €**	**797,839 €**	**949,992 €**	**1,108,238 €**	**1,273,640 €**
Allocation of profits:					
Income tax	188,714 €	231,373 €	275,498 €	321,389 €	369,356 €
Statutory Reserve	32,537 €	39,892 €	47,500 €	55,412 €	63,682 €
Dividends	260,295 €	319,136 €	379,997 €	443,295 €	509,456 €
Retained earnings	169,192 €	207,438 €	246,998 €	288,142 €	331,146 €
Total Earnings before Tax	**650,737 €**	**797,839 €**	**949,992 €**	**1,108,238 €**	**1,273,640 €**

[1] Projections in this report have been developed using a range of assumptions, which are available at the attached Excel file.

3.2 Scenario Analysis

Scenario Analysis is a method applied to determine the feasibility of a project in terms of the change in multiple variables simultaneously and assessing their impact on the viability of the project as a whole. The base-case scenario is formed by calculating the value of IRR on the basis of variable assumptions that are considered to be the most accurate. From there, other scenarios are formed called as a *best case or optimistic* and *worst case or pessimistic* scenarios. The probabilities are assigned to each scenario on the basis of inherent risk and then the computation is done accordingly.

The scenario analysis is considered better than the sensitivity analysis, in the sense that it considers the simultaneous change in the variables despite a change in the single variable at a time.

The assumptions of the scenario analysis of our project are summarized in Table 6 below:

Table 6 Assumptions of the scenario analysis

SENSITIVITY ANALYSIS	pessimistic	possible	optimistic
GROSS PROFIT RATE	25%	32%	38%
OPERATIONS TURNOVER	€5,000,000	€6,160,000	7,000,000 €
IRR	2.00%	8.00%	10.00%

The results are the following:

Table 7 Scenario analysis summary

Scenario Summary				
	Current Values:	Pessimistic	Possible	Optimistic
Gross profit rate	32%	25%	32%	38%
Operations turnover	6,160,000 €	5,000,000 €	6,160,000 €	7,000,000 €
IRR	0.080782058	0.02	0.080260745	0.1
	Net Profit / Loss	Net Profit /Loss	Net Profit/Loss	Net Profit/Loss
Year 1	650,737 €	80,337 €	650,737 €	1,230,337 €
Year 2	797,839 €	559,807 €	797,839 €	970,207 €
Year 3	949,992 €	692,917 €	949,992 €	1,136,149 €
Year 4	1,108,238 €	830,597 €	1,108,238 €	1,309,288 €
Year 5	1,273,640 €	973,788 €	1,273,640 €	1,490,774 €
	Gross profit	Gross profit	Gross profit	Gross profit
Year 1	1,971,200 €	1,250,000 €	1,971,200 €	2,660,000 €
Year 2	2,128,896 €	1,728,000 €	2,128,896 €	2,419,200 €
Year 3	2,299,208 €	1,866,240 €	2,299,208 €	2,612,736 €
Year 4	2,483,144 €	2,015,539 €	2,483,144 €	2,821,755 €
Year 5	2,681,796 €	2,176,782 €	2,681,796 €	3,047,495 €

From the scenario analysis we observe that a lower than current/possible gross profit rate, at the amount of 25%, operations turnover of 5.000.000€ than 6.160.000 € and an estimation of the IRR at 2%, affect the unit's gross profit negatively by a reduction of 721,200 € for Year 1 to 505,014 € for Year 5. As a result the net profits are reduced as well, from 650.737 € in the base scenario to 80.337 € in the pessimistic scenario for Year 1 and from a 1.273.640 € to a 973.788 € at Year 5.

On the other hand the optimistic scenario, with a 38% gross profit rate, a 10% IRR and operations turnover at 7.000.000 €, leave room for high expectations in the revenues, catapulting the gross profit at the amount of 2,660,000 € and the net revenues at 1,230,337 € in Year 1.

4. Evaluation of the proposed investment

When considering an individual project, as in our case, the IRR decision rule will always give exactly the same result as the NPV decision rule· when the discount rate (cost of capital) is less than IRR, the NPV will be positive.

And this is exactly what we observe from our calculations. The NPV is 1,790,980 € >0 and the IRR of the project is at 8.1 %, which is greater than the risk-free rate of return. Therefore, both indices arrive at the same conclusions.

Table 8 Investment performance

INVESTMENT PERFORMANCE						
		Year 1	Year 2	Year 3	Year 4	Year 5
Equity contribution / Dividends	1,485,418 €	260,295 €	319,136 €	379,997 €	443,295 €	509,456 €
Risk free rate	2.0%					
Net Present Value (NPV)	1,790,980 €					
Internal rate of return (IRR)	8.1%					

Estimating the profit will help to draw useful conclusions about the viability and attractiveness of the investment plan. From the examination of the operational results, we observe that the company from the first year of operation reports profitability. During the first year of operation net profits amount to 650,737€, with the production costs for the same period to 4,188,800 €. And at Year 5, we observe a net profit of 1.273.640€ with the costs at 5.698.816€, increased along with the revenues.

Finally, Cash Flow Statement yields a satisfactory surplus, while, according to the above methods of assessing the investment, we can characterize the project as advantageous and achievable.

Table 9 Cash flow analysis

CASH FLOW ANALYSIS	Year 1	Year 2	Year 3	Year 4	Year 5
Inflows:					
Earnings before depreciation	1,020,930 €	1,131,513 €	1,250,773 €	1,379,392 €	1,518,107 €
Loan (working capital)	742,709 €				
Equity contribution	742,709 €				
Total inflows	**2,506,347 €**	**1,131,513 €**	**1,250,773 €**	**1,379,392 €**	**1,518,107 €**
Outflows:					
Cost of investment					
Raw materials etc. (working capital)	1,000,000 €				
Loan payment	242,157 €	259,107 €	277,245 €	296,652 €	317,418 €
Tax	188,714 €	231,373 €	275,498 €	321,389 €	369,356 €
Dividends	260,295 €	319,136 €	379,997 €	443,295 €	509,456 €
Total outflows	**1,691,165 €**	**809,616 €**	**932,739 €**	**1,061,336 €**	**1,196,229 €**
Inflows-Outflows	815,182 €	321,896 €	318,034 €	318,056 €	321,878 €
Total	815,182 €	1,137,079 €	1,455,113 €	1,773,169 €	2,095,047 €

It is concluded that the unit has the ability to efficiently cover its operating and other expenses and to make profit.

5. Conclusion

For the evaluation of the present investment plan, there should be taken into account not only the benefit that will result to the shareholders from its implementation, but also the positive effects it may have on the Greek economy and society, in general.

Aquaculture products ensure high dietetic value proteins for nutrition and improve the living standards of the population of the country, contribute to job creation, finding new investment opportunities and saving of foreign currency, improving the trade balance of the country, as many of the farmed species in the sector (and in particular the sea bream and sea bass) have significant export interest.

The establishment of the new unit in the Prefecture of Fokida will create new jobs, most of which will be covered by the local labor market. Thus, this new investment plan will help to boost local economy and strengthens the local economy in which it is situated. In particular, industry's contribution to the regional economic growth is mainly due to increased family expenses of the employees, which lead to the creation of an additional income and other local economic activities.

From an environmental point of view, the unit will follow a strategy in order to continuously record the impacts of its operation on the marine environment. With the cooperation developed with various institutions and scientific groups, it will assist in the effort of others organizations to enrich knowledge on the subjects of environmental protection and circular economy.

After thorough analysis of all the aspects that affect it, we reach to the conclusion that the proposed investment plan, should be accepted.

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